WHAT IS CLAIMED IS:

1. A microscope system in which an electronic camera is used to pick up an observation image by a microscope, comprising:

a controlling section for setting an image pickup operation of an image pickup element in said electronic camera to an optimum state in accordance with a state of at least one of an optical system combination for a projection magnification of at least an objective lens and a photo eyepiece on a microscope side, an observation method, and lighting conditions.

2. The microscope system according to claim 1, further comprising:

a microscope controlling section for controlling an operation of said microscope; and

an image pickup element driving section for driving said image pickup element,

wherein said controlling section sets an image pickup element drive mode of said image pickup element driving section to a high speed drive mode, while the controlling section detects operation information outputted from said microscope controlling section.

3. The microscope system according to claim 1, further comprising:

a microscope controlling section for controlling an operation of said microscope; and

an image pickup element driving section for

driving said image pickup element,

wherein said controlling section sets a binning number of said image pickup element driving section based on an objective lens type outputted from said microscope controlling section.

4. The microscope system according to claim 3, wherein said controlling section comprises a memory in which a table of the objective lens type and the corresponding binning number is stored, compares the objective lens type outputted from said microscope controlling section with said table to determine the binning number, and sets the binning number as the binning number of said image pickup element driving section.

5. The microscope system according to claim 3, wherein said controlling section comprises a memory in which a table of the objective lens type and a corresponding NA of a light image incident upon said electronic camera is stored, compares the objective lens type outputted from said microscope controlling section with said table to obtain the NA of the light image incident upon said electronic camera, obtains a resolution R of said light image from the NA, obtains the binning number as a maximum integer of 1 or more satisfying:

$$B < R/2p$$

when the binning number is B and an element pitch of

said image pickup element is p, and sets the binning number as the binning number of said image pickup element driving section.

6. The microscope system according to claim 1, further comprising:

a microscope controlling section for controlling an operation of said microscope;

an image pickup element driving section for driving said image pickup element; and

an image forming lens and an intermediate magnification change optical system,

wherein said controlling section sets a binning number of said image pickup element driving section based on an objective lens type, an image forming lens type and a zoom magnification of the intermediate magnification change optical system outputted from said microscope controlling section.

7. The microscope system according to claim 6, wherein said controlling section comprises a memory in which a table of the binning number corresponding to a combination of the objective lens type, the image forming lens type and the zoom magnification of the intermediate magnification change optical system is stored, compares the combination of the objective lens type, the image forming lens type and the zoom magnification of the intermediate magnification change optical system outputted from said microscope

controlling section with said table to determine the binning number, and sets the binning number as the binning number of said image pickup element driving section.

8. The microscope system according to claim 6, wherein said controlling section comprises a memory in which a table of a combination of the objective lens type, the image forming lens type and the zoom magnification of the intermediate magnification change optical system and a corresponding NA of a light image incident upon said electronic camera is stored, compares the objective lens type, the image forming lens type and the zoom magnification of the intermediate magnification change optical system outputted from said microscope controlling section with said table to obtain the NA of the light image incident upon said electronic camera, obtains a resolution R (= $0.5\lambda/NA$ or $0.61\lambda/NA$: λ denoting one of wavelengths of lights constituting the light image) of said light image from the NA, obtains the binning number as a maximum integer of 1 or more satisfying:

$$B < R/2p$$

when the binning number is B and an element pitch of said image pickup element is p, and sets the binning number as the binning number of said image pickup element driving section.

9. The microscope system according to claim 6,

wherein said controlling section comprises a memory in which a table of an NA and a magnification corresponding to the objective lens type is stored,

compares the objective lens type outputted from said microscope controlling section with said table to obtain the NA of the objective lens,

obtains an image forming magnification of an optical system of said microscope from the objective lens type, the image forming lens type and the zoom magnification of the intermediate magnification change optical system outputted from said microscope controlling section,

obtains the NA of a light image incident upon said electronic camera from the NA of said objective lens and the image forming magnification of said optical system by the following equation:

NA = NA of the objective lens/the image forming magnification of the optical system,

obtains a resolution R (= 0.5λ/NA or 0.61λ/NA: λ denoting one of wavelengths of lights constituting the light image) of the light image from the NA,

obtains the binning number as a maximum integer of 1 or more satisfying:

$B < R/2p$

when the binning number is B and an element pitch of the image pickup element is p, and

sets the binning number as the binning number of

said image pickup element driving section.

10. The microscope system according to claim 1, further comprising:

a microscope controlling section for controlling an operation of said microscope; and

an AE calculating section for performing an automatic exposure control,

wherein said controlling section comprises a memory in which an AE calculation mode table of an observation method and a corresponding exposure calculation mode is stored, compares the observation method outputted from said microscope controlling section with said table to determine the exposure calculation mode, and sets the exposure calculation mode to said AE calculating section.

11. The microscope system according to claim 1, further comprising:

a microscope controlling section for controlling an operation of said microscope; and

an AE calculating section for performing an automatic exposure control,

wherein said controlling section stops an exposure time control in said AE calculating section, while the controlling section detects information of light path change of said microscope outputted from said microscope controlling section.

12. The microscope system according to claim 1,

further comprising:

a microscope controlling section for controlling an operation of said microscope; and

a frame memory for storing image data picked up by said image pickup element,

wherein said controlling section stops rewriting of the image data to said frame memory, while the controlling section detects information of light path change of said microscope outputted from said microscope controlling section.

13. The microscope system according to claim 1, further comprising:

a microscope controlling section for controlling an operation of said microscope; and

a cooling section for cooling said image pickup element,

wherein said controlling section changes a set temperature set to said cooling section in accordance with an observation method outputted from said microscope controlling section.

14. A microscope system in which an electronic camera is used to pick up an observation image by a microscope, comprising:

a controlling section for setting an adjusting operation of an image picked up by said electronic camera to an optimum state in accordance with a state of at least one of an optical system combination for a

projection magnification of at least an objective lens and a photo eyepiece on a microscope side, an observation method, and lighting conditions.

15. The microscope system according to claim 14, further comprising:

a microscope controlling section for controlling an operation of said microscope; and

an image adjusting section for adjusting image data picked up by said image pickup element,

wherein said controlling section comprises a memory in which a shading correction pattern in accordance with an objective lens type is stored, compares the objective lens type outputted from said microscope controlling section with a content of said memory, and sets the shading correction pattern in accordance with the objective lens type to said image adjusting section, and

said image adjusting section performs a shading correction of the image data in accordance with the set shading correction pattern.

16. The microscope system according to claim 15, wherein said shading correction pattern is a pattern in which a gain correction value in accordance with a position on an image pickup surface of said image pickup element is stored, and

said image adjusting section performs a gain correction of the image data corresponding to the

position on the image pickup surface of said image pickup element based on the gain correction value of said pattern.

17. The microscope system according to claim 14, further comprising:

a microscope controlling section for controlling an operation of said microscope;

an image adjusting section for adjusting image data picked up by said image pickup element; and

an image forming lens and an intermediate magnification change optical system,

wherein said controlling section comprises a memory in which a shading correction pattern in accordance with an objective lens type and a zoom magnification of the intermediate magnification change optical system is stored, compares the objective lens type and the zoom magnification of the intermediate magnification change optical system outputted from said microscope controlling section with a content of said memory, and sets the shading correction pattern in accordance with the zoom magnification of the intermediate magnification change optical system to said image adjusting section, and

said image adjusting section performs a shading correction of the image data in accordance with the set shading correction pattern.

18. The microscope system according to claim 17,

wherein said shading correction pattern is a pattern in which a gain correction value in accordance with a position on an image pickup surface of said image pickup element is stored, and

said image adjusting section performs a gain correction of the image data corresponding to the position on the image pickup surface of said image pickup element based on the gain correction value of said pattern.

19. The microscope system according to claim 14, further comprising:

a microscope controlling section for controlling an operation of said microscope;

an image adjusting section for adjusting image data picked up by said image pickup element; and

an intermediate magnification change optical system,

wherein said controlling section comprises a memory in which a shading correction pattern in accordance with an objective lens type is stored, compares the objective lens type outputted from said microscope controlling section with a content of said memory, obtains the shading correction pattern in accordance with the objective lens type, corrects the shading correction pattern in accordance with a zoom magnification of said intermediate magnification change optical system, and sets the shading correction pattern

to said image adjusting section, and

said image adjusting section performs a shading correction of the image data in accordance with the set shading correction pattern.

20. The microscope system according to claim 19, wherein said shading correction pattern is a pattern in which a gain correction value in accordance with a position on an image pickup surface of said image pickup element is stored, and

said image adjusting section performs a gain correction of the image data corresponding to the position on the image pickup surface of said image pickup element based on the gain correction value of said pattern.

21. The microscope system according to claim 14, further comprising:

a microscope controlling section for controlling an operation of said microscope;

an image adjusting section for adjusting image data picked up by said image pickup element; and

an image forming lens,

wherein said controlling section comprises a memory in which a shading correction pattern in accordance with a combination of an objective lens and the image forming lens is stored, compares an image forming lens type outputted from said microscope controlling section with a content of said memory, and

sets the shading correction pattern in accordance with the image forming lens type to said image adjusting section, and

said image adjusting section performs a shading correction of the image data in accordance with the set shading correction pattern.

22. The microscope system according to claim 21, wherein said shading correction pattern is a pattern in which a gain correction value in accordance with a position on an image pickup surface of said image pickup element is stored, and

said image adjusting section performs a gain correction of the image data corresponding to the position on the image pickup surface of said image pickup element based on the gain correction value of said pattern.

23. The microscope system according to claim 14, further comprising:

a microscope controlling section for controlling an operation of said microscope; and

an image adjusting section for adjusting image data picked up by said image pickup element;

wherein said controlling section comprises a memory in which a color matrix in accordance with lighting conditions is stored, compares the lighting conditions outputted from said microscope controlling section with a content of said memory, and sets the

color matrix in accordance with the lighting conditions to said image adjusting section, and

said image adjusting section performs a color conversion of the image data in accordance with the set color matrix.

24. A microscope system in which an electronic camera is used to pick up an observation image by a microscope, comprising:

a controlling section for setting recording of an image picked up by said electronic camera to an optimum state in accordance with a state of at least one of an optical system combination for a projection magnification of at least an objective lens and a photo eyepiece on a microscope side, and an observation method.

25. The microscope system according to claim 24, further comprising:

a microscope controlling section for controlling an operation of said microscope; and

an image adjusting section for adjusting image data picked up by said image pickup element,

wherein said controlling section sets a recording pixel number of an image recording section based on an objective lens type outputted from said microscope controlling section.

26. The microscope system according to claim 25, wherein said controlling section comprises a memory in which a table of the objective lens type and a

corresponding NA of a light image incident upon said electronic camera is stored, compares the objective lens type outputted from said microscope controlling section with said table to obtain the NA of the light image incident upon said electronic camera, obtains a resolution R (= $0.5\lambda/NA$ or $0.61\lambda/NA$: λ denoting one of wavelengths of lights constituting the light image) of the light image from the NA, obtains the recording pixel number as a maximum pixel pitch satisfying:

$$Ip < R/2$$

when a pixel pitch of a recorded image is Ip, and sets the recording pixel number as the recording pixel number of said image recording section.

27. The microscope system according to claim 24, further comprising:

a microscope controlling section for controlling an operation of said microscope;

an image adjusting section for adjusting image data picked up by said image pickup element; and

an image forming lens and an intermediate magnification change optical system,

wherein said controlling section sets a recording pixel number of an image recording section based on an objective lens type, an image forming lens type and a zoom magnification of an intermediate magnification change optical system outputted from said microscope controlling section.

28. The microscope system according to claim 27, wherein said controlling section comprises a memory in which a table of a combination of the objective lens type, the image forming lens type and the zoom magnification of the intermediate magnification change optical system and a corresponding NA of a light image incident upon said electronic camera is stored, compares the objective lens type, the image forming lens type and the zoom magnification of the intermediate magnification change optical system outputted from said microscope controlling section with said table to determine the NA of the light image incident upon said electronic camera, obtains a resolution R (= $0.5\lambda/NA$ or $0.61\lambda/NA$: λ denoting one of wavelengths of lights constituting the light image) of the light image from the NA, obtains the recording pixel number as a maximum pixel pitch satisfying:

$$Ip < R/2$$

when a pixel pitch of a recorded image is Ip, and sets the recording pixel number as the recording pixel number of said image recording section.

29. The microscope system according to claim 27, wherein said controlling section comprises a memory in which a table of an NA and a magnification corresponding to the objective lens type is stored, compares the objective lens type outputted from said microscope controlling section with said table to

obtain the NA of the objective lens,

obtains an image forming magnification of an optical system of said microscope from the objective lens type, the image forming lens type and the zoom magnification of the intermediate magnification change optical system outputted from said microscope controlling section,

obtains the NA of a light image incident upon said electronic camera from the NA of said objective lens and the image forming magnification of said optical system by the following equation:

NA = NA of the objective lens/the image forming magnification of the optical system,

obtains a resolution R (= 0.5λ/NA or 0.61λ/NA: λ denoting one of wavelengths of lights constituting the light image) of the light image from the NA,

obtains the recording pixel number as a maximum pixel pitch satisfying:

$Ip < R/2$

when a pixel pitch of a recorded image is Ip, and

sets the recording pixel number as the recording pixel number of said image recording section.

30. A microscope system in which an electronic camera is used to pick up an observation image by a microscope, comprising:

a controlling section for setting a display method of the observation image in a display section to an

optimum state in accordance with an operation state of said microscope.

31. The microscope system according to claim 30, further comprising:

a microscope controlling section for controlling an operation of said microscope,

wherein said controlling section turns OFF displaying by said display section during exposure, when an observation method outputted by said microscope controlling section is a fluorescent observation.

32. The microscope system according to claim 30, further comprising:

a microscope controlling section for controlling an operation of said microscope,

wherein said controlling section displays a residual exposure time in a part of said display section, and brings other parts to a low luminance or non-emission state during exposure, when an observation method outputted by said microscope controlling section is a fluorescent observation, and static image pickup is instructed.